SECTION 7

RECORDER SERVICING

7.0 RECORDER REMOVAL PROCEDURES

Certain servicing procedures necessitate removal of the Recorder from the Model 115 Fetal Monitor. Removal procedures are defined below:

1. Remove the two rear-panel screws which fasten the top cover in place.
2. Remove bezel with extreme care.

CAUTION: Use care when removing bezel from cabinet to avoid breaking top ears or allowing bezel to drop forward; this could damage the small printed-circuit board located near front-end of chassis.

   a) Remove the three screws located under front bezel (on older units only).

   b) Remove the two screws from each ear of front bezel's top section.

   c) Hold the bezel by its sides and rotate forward until the top tabs are cleared.

   d) Slide bezel forward until the bottom tabs are cleared.

   e) Rotate bezel and lay it face down on a bench; avoid putting unnecessary stress on the ribbon cable.

3. Unplug the recorder ribbon cable and the stepper-motor harness from Recorder Board.
4. Remove the two screws from the crossbar and its attached posts at recorder's rear. On newer models, there is no crossbar; remove the four screws which attach the recorder to the monitor's bottom cover.
5. Lift out recorder.

7.1 PERIODIC MAINTENANCE (ANNUAL)

Periodic maintenance of the recorder is performed annually, and is limited to lubrication of those areas outlined below. However, it is advisable to occasionally clean the printhead face with an alcohol-soaked cotton swab.

Roller and Drawer Lever Bearings

Lubricate the bearings by opening the drawer and placing a small amount of #186 synthetic oil on them. (This oil is available from the Nye Co., New Bedford, Mass.) Also, a light sewing machine oil is acceptable. Oil sparingly and wipe off excess.

Jackshaft Bearings

Remove the monitor's top cover and locate the drive chain and gear. Using a syringe oiler (with a needle long enough to reach journal between gear and recorder housing) apply a small amount of oil to the shaft.

Right-Hand/Left-Hand Bearings

These bearings can be oiled from the monitor's front, using a syringe needle. Insert the needle between the housing and side of drawer. (Left-Hand Bearings can be oiled in like manner if a needle thinner than 0.30-inch is available.)

7.2 FIELD SERVICING

Disassembly and/or replacement of most recorder parts normally requires the use of special gauges and fixtures to ensure critical tolerances are satisfied. This includes items such as the paper-drawer assembly, recorder housing, jackshaft and roller, and their associated bearings. Therefore, field replacement is not recommended and field servicing is limited to the following recorder subassemblies:

- Photo-Sensor Assembly
- Stepper-Motor and Harness Assembly
- Printhead Assembly

CAUTION: If a sudden or complete failure of the printhead occurs, the exact cause must be diagnosed accurately and corrected prior to installation of a new printhead.

Servicing of any recorder parts, other than the three subassemblies outlined above, should be referred to the nearest Field Representative or Corometrics' Service Department.

7.3 REFLECTIVE-SENSOR REPLACEMENT

Although reflective-sensors may be replaced in the field, a gauge, as depicted in FIGURE 7-1, is required to maintain critical tolerances during reinstallation of the assembly. **This gauge is not a Corometrics supplied item, therefore the user must have the tool constructed locally.** Photo-sensor replacement procedures are outlined below:

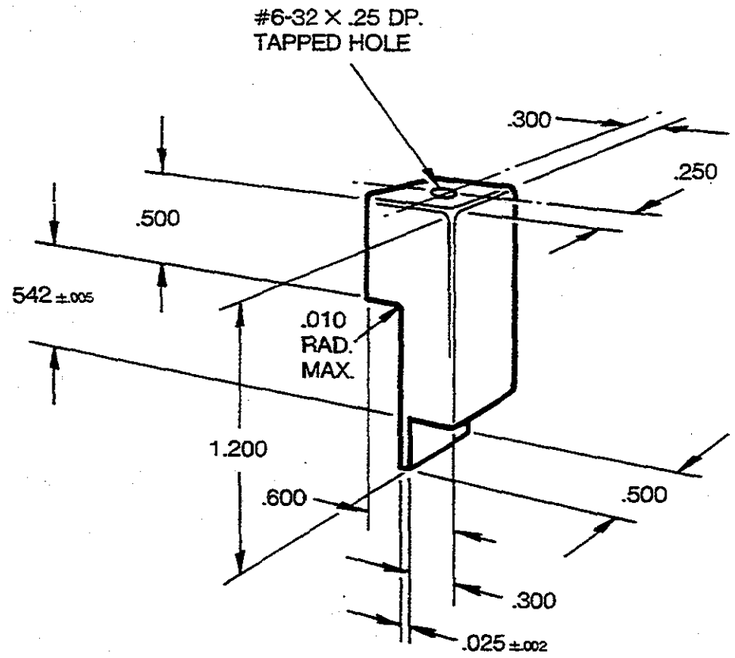


PHOTO-SENSOR ASSEMBLY — TOLERANCE GAUGE
FIGURE 7-1

1. Remove recorder from monitor (refer to Section 7.0).
2. Open paper drawer. A reflective-sensor is mounted on each side of the tray top which is fastened to the support bars by two #6 Hex Nuts. They are visible from the rear of the housing.
3. Unplug printhead harness (two ribbon-cables, 7-pin plugs) from printhead.

CAUTION: Both sets of male pins on the printhead should be wrapped in aluminum foil to avoid damage caused by static electricity. This should be done regardless of the printhead's "static protected" condition as a CMOS device.

4. Remove both #6 Hex Nuts (including lockwashers and flat washers) which fasten the tray and support bar together.
5. Slip tray forward and under support bar. This permits access to the photo-sensor clamp screws.
6. Remove the clamp screws from sensor being replaced, and free clamp from tray.

NOTE: Refer to Section 5 for potentiometer adjustment procedures following photo-sensor replacement.

7. Insert new sensor into plug as depicted in FIGURE 7-2. Fasten sensor to tray using the clamp. Slip tray into support bar, install nuts and washers, and finger tighten only.

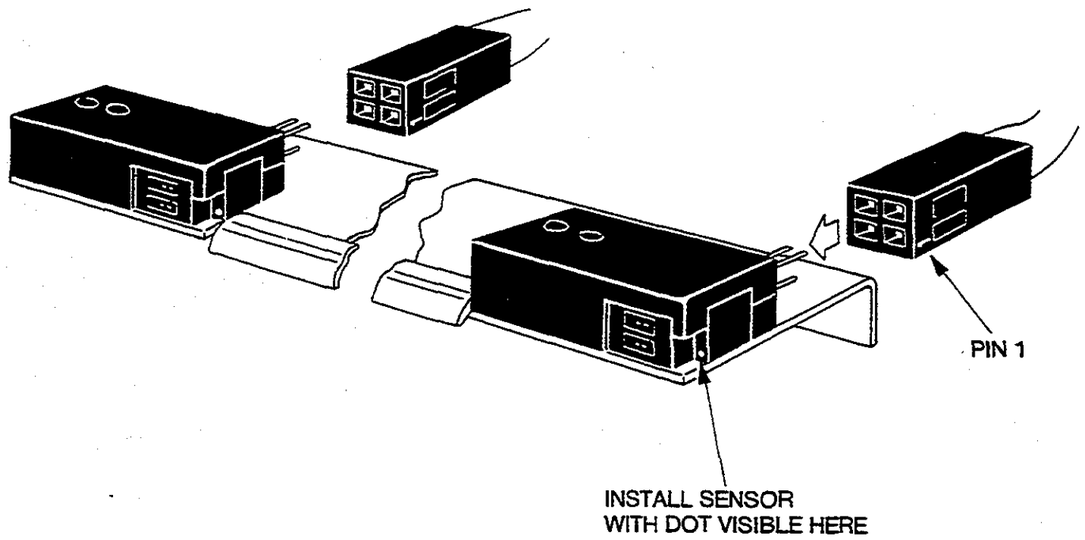


PHOTO-SENSOR REINSTALLATION
FIGURE 7-2

8. Open the paper drawer. Note position "F" on top of drawer immediately behind roller in FIGURE 7-3.
9. Close door and note position of tray as indicated by the letter "G" in FIGURE 7-3. Use a tolerance gauge, as depicted in FIGURE 7-1, to set clearance between end of sensor clamp and side of drawer.
10. After inserting the gauge, butt sensor against it and the drawer wall. Tighten Hex Nut on opposite side of support bar. (Tighten only enough to eliminate lateral movement and maintain established clearance.)
11. With the gauge still inserted, note that the support bar can be moved up and down slightly (while lifting gauge slightly off drawer top). Position the bar so that the gauge rests on top of the drawer, and then tighten the remaining Hex Nut.
12. Insert gauge on other side of housing with its face resting on the tray. Loosen Hex Nut on this side and adjust for vertical clearance as in step 11 above. (Horizontal clearance between tray is set on opposite side only.)
13. To complete the replacement procedure, connect all cables and reinstall recorder into monitor.

7.4 PRINTHEAD ALIGNMENT PROCEDURES

Refer to FIGURE 7-3 for identification of adjustment points outlined in this section and to assist in clarifying adjustment procedures.

ADJUSTMENT POINTS

The following adjustments, A through C, control coordinates affecting the graphics display normally viewed on the strip chart.

NOTE: Adjustments A through D can be performed without removing recorder from monitor. Access is obtained by removal of the top cover.

A: Spline-head screw which determines the vertical off-set of a horizontal line.

B: Spring-loaded slot-head screw which controls the horizontal offset of a vertical line with respect to the top of heart rate side of the strip chart.

C: Spring-loaded slot-screw which controls horizontal offset of a vertical line with respect to the bottom of the pressure side of the strip chart.

D: Locking collar which controls end play of the pivoting support. End Play should be checked periodically to insure the following conditions are satisfied:

1. Pivoting support moves up and down freely.
2. Printed trace is not erratic vertically. (Such an occurrence indicates excessive end play.)

NOTE: Adjustments D and E control tolerances necessary for proper recorder operation. However, adjustment E requires removal of the bezel to allow access to the adjustment locations. This adjustment is not necessary under normal circumstances.

E: These spline-head screws with lock nuts labeled "E", set the lower limits for vertical travel of the printhead in respect to the roller. With paper drawer closed, clearance between bottom of screws and crossbar should be no more than .008 – .012 inch.

PRINTHEAD ALIGNMENT

The printhead can be aligned by the Vertical Offset Adjustment or Horizontal Offset Adjustment. Procedures for each of these adjustments are outlined below:

Vertical Offset Adjustment

To check vertical alignment, run at least two monitor self-tests (depress front-panel TEST pushbutton). The first vertical trace should be printed .475 ± .002 inch from the right hand paper guide. If Vertical Offset requires adjustment, perform the following steps:

1. Loosen set screws labeled "I" in FIGURE 7-3
2. Adjust spline-head screw labeled "A" until test trace falls within specified tolerance.
3. Tighten the two set screws.

Horizontal Offset Adjustment

Adjustment of the Horizontal Offset is indicated if any of the following symptoms are detected:

- Paper consistently pulls to one side.
- Printing of unequal weight occurs along vertical trace line, from one end to the other.
- Missing dots along vertical trace.
- Printing is too light following printhead replacement.

NOTE: If skewing occurs, check for other malfunctions. Noticeable skewing of a vertical line printed on the strip chart is usually accompanied by one of the symptoms listed above.

If the Horizontal Offset Adjustment is required, perform the following steps:

1. Loosen the four hex-head lock screws labeled "2" in FIGURE 7-3.
2. To move the printhead forward on one side, back-off the corresponding spring-loaded screw (turn counterclockwise) from its alignment block.
3. After making the necessary adjustments, tighten the four hex-head lock screws.

7.5 PRINTHEAD REPLACEMENT PROCEDURES

Description

The printhead is part of the Printhead Assembly. This component is rated for years of heavy service and should last for the monitor's useful lifespan. However, under extraordinary circumstances, such as a catastrophic failure, the printhead may have to be replaced.

CAUTION: Sudden printhead failure may be an indication of a serious or widespread monitor malfunction. Corometrics recommends its service department be contacted in the event of a printhead failure prior to initiation of replace-

Tools Required

- 3/16" Screwdriver
- Needlenose Pliers
- Miniature Screwdriver
- Voltmeter with clip leads

Printhead Removal

1. Disconnect monitor from power source. Unplug all accessories and check that recorder door is shut.
2. Use the 3/16" screwdriver to remove the two cover retaining screws located on upper back side of monitor; lift off cover.
3. Use the same screwdriver to remove the two front-bezel retaining screws located on each end of bezel top. On older production units three flathead screws must also be removed from bottom-front of chassis; the power switch should be in OFF or out position. Pull top edge of bezel forward separating it from chassis. Wiring need not be disconnected.
4. Use the same screwdriver to remove the four downstop bracket-mounting screws and the two downstop brackets. Separate the downstop brackets to ensure they are returned to their original locations. Do not disturb Allen screws.
5. Slowly open the recorder door being careful not to release the four pressure springs compressed between the printhead extrusion and the pressure bar.
6. Pressure on the four springs has now been relieved; use the needle-nose pliers to remove all four.
7. Unplug the two printhead harness plugs from printhead. Record the location of each for later reinsertion.
8. Use the 3/16" screwdriver to remove the three printhead mounting screws. Slide the printhead out in the direction of recorder rear.

Printhead Installation

1. Carefully remove new printhead from packaging; do not touch any of the contact pins. Record the voltage rating on decal affixed to bottom of printhead.
2. Slide new printhead into position under its extrusion. Replace and tighten the three printhead mounting screws using the 3/16" screwdriver.
3. Reconnect the two printhead harness plugs in their original locations.
4. Use needlenose pliers to replace the four pressure springs in their respective holes in printhead mounting extrusion.
5. Push down with fingers on rear edge and pull up with thumb on forward edge to raise front edge of printhead assembly and to compress the four pressure springs. Hold like this and close door with other hand. Check to make sure all springs are in proper position.
6. Replace the two downstop brackets, each in its original location. Use the 3/16" screwdriver to fasten the brackets with the four downstop mounting screws.
7. Push in plunger on rear of ON/OFF button; this pushes out the button from the front panel. At the same time, use other hand to rotate button slightly, forcing button to remain pushed out.
8. Replace front bezel onto chassis by hooking angled catches of the former into mating notches of the latter. On early production units, position bezel on front of chassis and reinsert the three flathead screws through the bottom of the chassis. Push bezel into position by applying pressure along top edge.
9. Replace the two bezel holding screws in the top side ends of the bezel and tighten with 3/16" screwdriver.
10. Twist ON/OFF button into proper position and test for proper operation.
11. Refer to Section 7.4.
12. Load recorder with paper. Plug monitor to power cord and activate. Use the voltmeter to measure the adjustable printhead voltage by attaching the negative lead to GND pin and the positive lead to VHEAD pin, and activating the recorder. Next, use the miniature screwdriver to adjust R4 until the measured voltage equals the new printhead voltage rating (recorded in step 1). Use Torque Seal to lock this voltage setting. Disconnect voltmeter.

13. Position forward lip of cover under top edge of front bezel and lower rear into place. Replace the two cover retaining screws and tighten with 3/16" screwdriver. Monitor is now ready for use.

7.6 STEPPER-MOTOR REPLACEMENT

The recorder must be removed from its cabinet, as outlined in Section 7.0, before replacement of the stepper-motor can be accomplished.

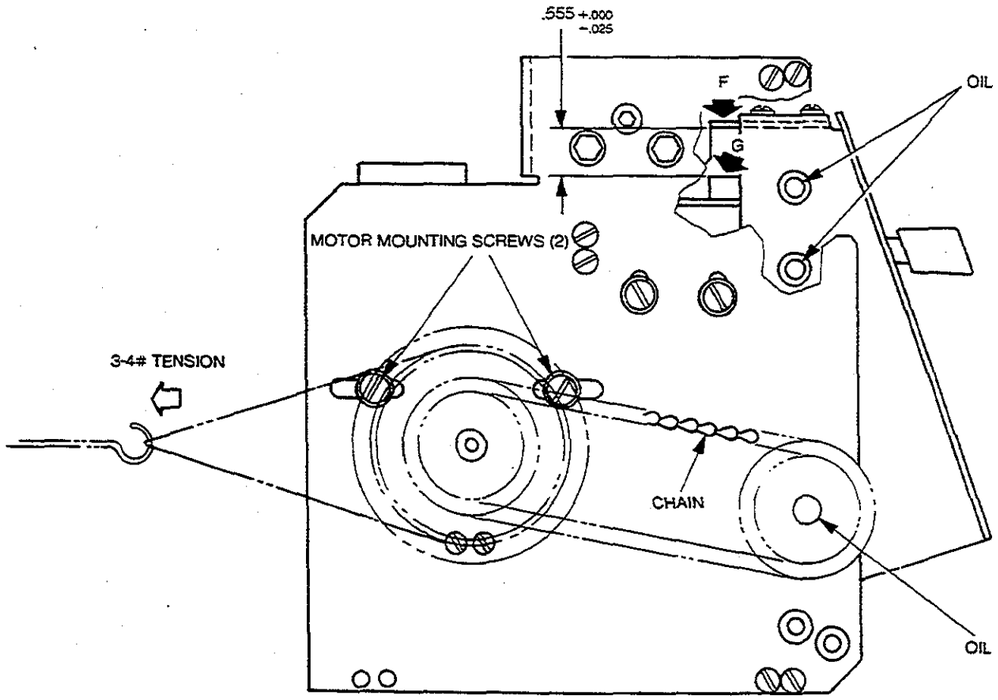
Stepper-Motor Removal Procedure

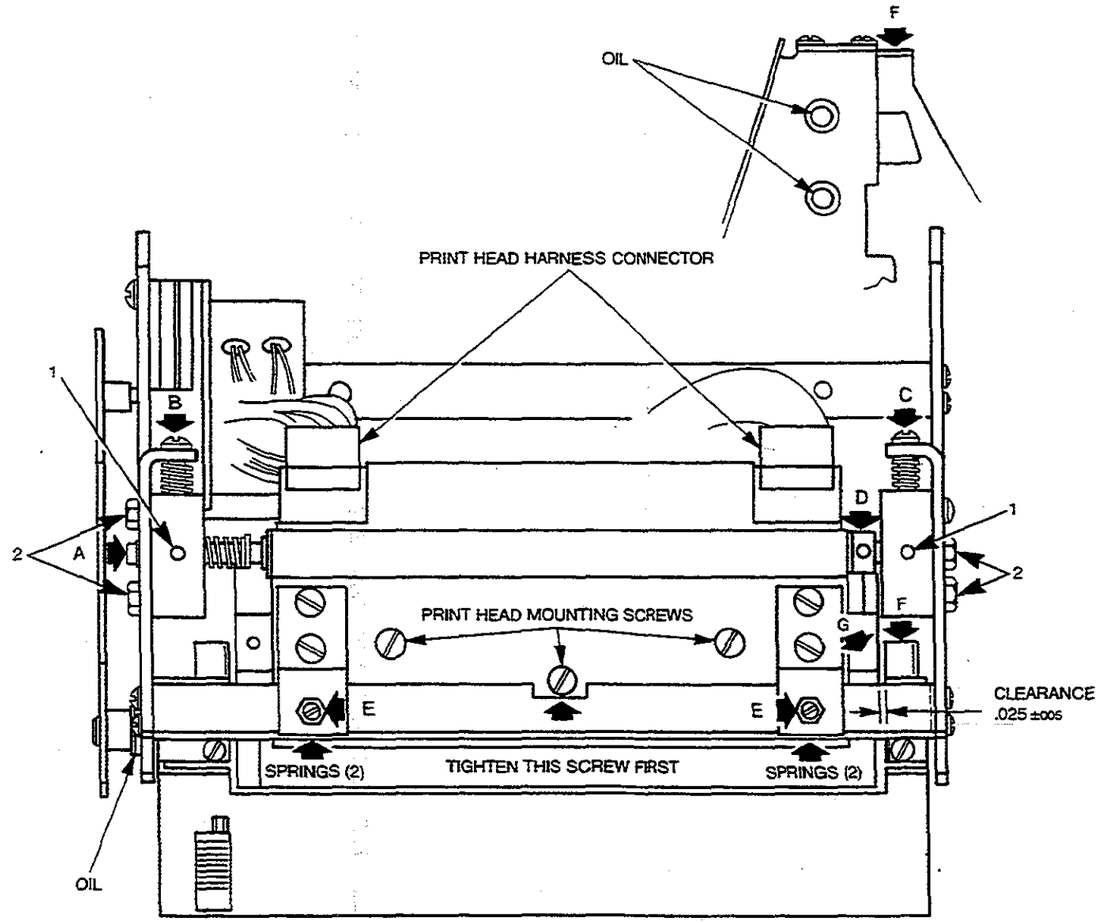
NOTE: Before proceeding, examine position of the links as they pass over the sprockets. The link hooks should be up with the ends facing away from direction of rotation as depicted in FIGURE 7-3.

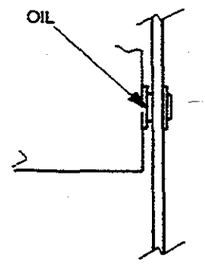
1. Loosen the two motor mounting screws (refer to FIGURE 7-3) and then slide motor forward.
2. Remove drive chain.
3. Remove both mounting screws and their associated lockwashers and flat washers.
4. Remove stepper-motor.

Stepper-Motor Installation Procedures

1. Mount new stepper-motor.
2. Install mounting screws and associated hardware but do not tighten.
3. Remount drive chain.
4. Loop a piece of cord or a rubber drive belt around the stepper-motor body.
5. Using a spring scale, increase tension on the cord toward rear of motor until it registers 3 to 4 pounds, and tighten one of the screws. (This sets the correct tension on the drive chain.)
6. Tighten the remaining mounting screw and reinstall the recorder. This completes stepper-motor replacement procedures.







PRINTHEAD
FIGURE 7-3